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Southall Bros. & Barclay

(LIMITED.)

ELEVENTH ANNUAL LABORATORY REPORT.

BIRMINGHAM,

JANUARY, 1903.

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ELEVENTH
ANNUAL REPORT

FROM THE

ANALYTICAL LABORATORIES

OF

SOUTHALL BROS. & BARCLAY
(LIMITED.)

EDITED BY

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MEMBER OF THE PHARMACEUTICAL SOCIETY.

BIRMINGHAM, JANUARY, 1903.

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PREFACE.

THE universal commendation with which our last Annual Report was received gave us considerable gratification, and we are glad to be able this year to publish another collection of notes, which we think will be found to be equal in interest to those previously recorded.

At the end of last year we found it necessary to speak of the grudging appreciation with which the principle of the Standardization of Pharmaceutical Preparations was received, but we are glad to find that we have no longer any cause to complain in this respect, since during the year numerous apostles of Standardization have arisen, all of them with one accord not only commending the principle, but also giving figures and making suggestions for carrying it into effect.

It is now about 14 years since we first published a little pamphlet entitled "A new departure in Therapeutics," which consisted of a series of Standards for Official Tinctures. As the pioneers in the Standardization movement, we gladly welcome the efforts which are now becoming general amongst pharmacists to promote this principle, and in order to give the utmost assistance to the Authorities who will finally have to officially deal with the matter, we are dealing as fully as possible with the subject by publishing not only certain new results, but also re-enumerating what we have previously recorded.

During the past year there has been a large increase in the amount of work performed in our Analytical Laboratories, the total number of samples examined being 6,755, as against 5,456 of last year.

The following notes are taken entirely from our Laboratory Journal, in which the experiments in question are recorded, and the Editor has pleasure in placing on record the very valuable help which has been given to him in the work by Mr. E. W. MANN and the other chemists on his staff.

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CRUDE DRUGS, FIXED OILS, WAXES, etc.

The following notes taken from our laboratory journal show the results of examinations of a number of crude drugs, which have either been tested for purity or assayed with a view of ascertaining the proportion of valuable or essential ingredients present. We are able to give a number of figures showing percentages of alkaloid, resin, glucoside, etc., contained in official drugs, but we do not for a moment advocate the adoption of any standard for these, since, as we have often pointed out, we regard attempts to standardize crude drugs as being more or less futile. In our opinion all efforts in the direction of standardization should be expended upon Galenical Preparations, since however variable the drugs from which they are made may be, complete uniformity may in the case of preparations be not only aimed at but ensured. If this principle were universally adopted alkaloidal drugs of poor quality would find their place, and not necessarily be ruled out of use. There is no doubt too but that in course of time the principle of purchasing parcels of drugs on guaranteed assay will become more general than it is at the present time, since the proportion of active principle would in more cases than now govern the market price of the drug.

We may add that in confining standardization to preparations we should consider it necessary to include certain powdered drugs under that head, such for example as Ipecac, Opium, etc., which either alone or in admixture with other substances are used for dispensing purposes.

Belladonna Root.—The figures which we have obtained by the examination of this drug during the year go to prove that those obtained last year, viz., 0·54 per cent. by weight, and 0·47 per cent. by titration, are representative of a root of good commercial quality, the actual figures obtained being 0·52 and 0.46 respectively. A sample of English root grown at Stratford-on-Avon gave us 0·39 per cent. alkaloid by weight, 0·34 per cent. by titration, these latter figures being considerably lower than those obtained by an examination of a root grown in the South of England examined and reported upon last year.

Benzoin.—Further researches made in connection with this drug, and the compound tincture prepared from it, have enabled us during the year to publish a paper dealing with the whole question of the percentage of Balsamic Acids present in

Benzoin, and its tincture. For full particulars of this research we refer our readers to page 30, under Compound Tincture of Benzoin, where it will be seen that we have worked out an improved process for the assay of both crude drug and tincture, whereby a percentage of free and combined Balsamic Acid may be arrived at. During the year ten samples of Sumatra Benzoin have been examined, and the following figures show the mean results obtained:—

Solubility in 90 per cent. alcohol ...	69·89 per cent.
Free Balsamic Acid calculated as Benzoic	9·17 ,,
Combined Balsamic Acids calculated as Benzoic	10·03 ,,

As the result of our experience of the Benzoin question we have come to the conclusion that the B.P. standard of "almost entirely soluble in alcohol (90 per cent.)" must be altered if the Sumatra variety is to keep its place as an official drug. Nor do we regard the adoption of an allowance for insoluble matter when making the tincture as satisfactory. Better, however, than any standard for the crude drug would be the plan of standardizing the preparations into which it enters. Our experience of good commercial Sumatra Benzoin shows it to contain an average of about 70 per cent. of soluble matter, and to yield by our method about 20 per cent. of Balsamic Acids calculated as Benzoic, not much less than half of which is present in uncombined condition. In making the compound tincture a drug of this quality would yield up to it a proportion of the Balsamic Acids which go to make up the total percentage of those acids which we have suggested should be adopted as a standard (see Compound Tincture of Benzoin, page 30).

Carnauba Wax.—Samples examined during the year gave the following mean results:—

Specific gravity	1·005.
Melting point	84°C.
Caustic Potash absorbed	7·95 per cent.

Beeswax.—Out of ten samples examined during the year two proved to be adulterated, one showing a specific gravity of 0·988 and a melting point of 57·5 C., the other having a specific gravity of 0·872 and containing a quantity of paraffin. The following figures, giving a comparison of the results obtained on pure samples of white and yellow wax respectively, may be of interest:—

	White Wax. Mean of 5 samples.	Yellow Wax. Mean of 5 samples.
Specific gravity	0·969	0·966
Melting point	62·1	63·0
Caustic Potash required for neutralization of free acid in 5 grammes ...	1·69	1·8
Caustic Potash (further) required for complete saponification of 5 grammes	7·36	6·52

Cetaceum.—The average melting point of four samples examined during the year was 44·62°C, and the mean saponification equivalent of the same proved to be 449·2.

Cetaceum, Oil of.—An examination of five samples gave results as tabulated below:—

Specific gravity	0·874—0·879
Percentage of KOH for saponification ...	11·78—13·08
Iodine absorbed	76·80—86·32
Flash point	246°—270°
Non-saponifiable fats	36·08—39·0
Fat acids	60·70—61·68

Cinchona Bark.—As showing the very low percentage of alkaloid sometimes found in this drug, we may mention that a sample of bark in coarse powder, consisting apparently of sweepings, gave on analysis 0·57 per cent. of Quinine and Cinchonidine, and 0·91 per cent. of other alkaloids.

Coca Leaves.—As was also the case last year, we have to note a very considerable variation in the alkaloidal percentage of this drug, the amount ranging from 0·13 in a sample of Peruvian leaves to 0·84 in a parcel of the Bolivian variety. We consider it to be of the highest importance that the fluid extract of this drug should be required to contain a definite percentage of alkaloid, and we again record our opinion that the so-called non-excisable Coca Wine should find a place in the Pharmacopœia.

Colza Oil.—The mean specific gravity of several samples examined during the year worked out at 0·914, and the percentage of Caustic Potash varied from 17·25 to 17·34. As we have previously had occasion to remark, the physical constants of this oil vary within very small limits.

Copaiba.—Seven samples examined for percentage of volatile oil gave a mean of 47·97, and two of the samples in question yielded a soft resin after removal of oil. In the matter of presence of Gurgun Balsam, the application of the official test to eighteen samples showed ten to be either suspicious in quality, or undoubtedly adulterated. We consider it to be of the greatest importance that some more satisfactory tests of a quantitative character should be provided for the detection of impurities in this drug.

Creosote.—In seven samples examined during the year, the specific gravity ranged from 1·081 to 1·089, and the distillation points were found to lie between 198°C. and 225°C. In other respects the samples proved satisfactory, and we may again record our opinion that the B.P. requirements in point of distillation limits are somewhat unnecessarily stringent.

Saffron.—Fifteen samples examined during the year showed a percentage of moisture ranging from 9·22 to 16·26 per cent. The ash calculated on the dried drug ranged from 4·5 to 6·8 per cent., the whole of the samples in this respect corresponding with the B.P. requirements.

Ergot.—The percentage of matter soluble in water varied in five samples examined from 16·4 to 19 per cent., but it is to be noted that the proportion of water soluble matter is by no means a complete criterion of the value of this drug, since an insect-ravaged sample will frequently give as high a percentage as a parcel of clean, whole drug.

Reduced Iron.—The mean percentage of metallic iron found in a number of samples examined during the year proved to be 83·1 per cent., showing that the standard of the Pharmacopœia is well within reach.

Glucose (liquid).—The proportion of true glucose found by the examination of several samples showed a mean of 40·16 per cent., and only in one case was the presence of arsenic (a minute trace) detected.

Glycerine.—Twenty-one samples were examined during the year, and in seven of these a mere trace of arsenic was discovered. In no case was the presence of iron detected, but several samples gave evidence of the presence of a trace of chloride.

Hydrochloric Acid.—We continue to find it of the utmost importance to make careful tests of the so-called pure acid of commerce before passing it into stock for sale as of B.P. quality. As stated in our report of last year it is practically impossible to obtain from acid manufacturers an article which will comply with the official test of "yielding no characteristic reaction for arsenic." We, however, find that it is quite possible to obtain an acid which, while showing on a prolonged application of Marsh's test, a minute trace of arsenic, is still sufficiently pure for medicinal use. We continue to prepare an absolutely arsenic-free acid by a special process, the product of which, however, is better suited for the analytical laboratory than for the pharmacy.

Hyoscyamus Leaves.—An examination of a parcel of Egyptian herb, which we may remark is said to be derived from Hyoscyamus muticus, gave to us a percentage of total alkaloid corresponding to 0·66 per cent. by weight, or 0·52 per cent. by titration, thus confirming the results obtained by Dunstan and Brown recorded in Proc. Chem. Soc., xvi., 207. Without touching on the question as to the nature of the alkaloid present in the herb, it seems safe to remark that here is a drug which might turn out to be of considerable value, having in view how very much more alkaloid it contains (about five times as much) than the English drug. A sample of the latter of our own drying gave 0·09 per cent. (by titration).

Cocoanut Oil.—The following table shows the results of the examination of eleven samples tested during the year :—

Specific gravity at 99°C.	0·869 to 0·876
Saponification equivalent	214 to 217
Melting point	25° to 26·5° C.

We may here repeat our remark of last year that we do not find either the melting point or the saponification equivalent to be anything like so variable as the published authorities state them to be.

Ipecac Root.—Twenty-eight samples of Brazilian root examined during the year showed a percentage of alkaloid varying from 1·89 to 2·55, or an average percentage on the whole samples of 2·29. A sample of Johore Ipecac gave 2·36 per cent. of alkaloid, and since this variety is said to contain the two alkaloids in the same proportions as does the Brazilian root, there does not appear to be any reason why it should not be used for making the official preparations.

It is to be regretted that out of the number of papers dealing with Ipecac, which have been published during the year, no satisfactory method for the separation and determination of the two alkaloids in the root has been given. Both liquid extract and wine of Ipecac might at the present time be prepared from the Carthagena root without possibility of detection, and in view of the well-authenticated statements as to the difference in therapeutic value between the two roots, we consider that the fixing of a standard for Emetine instead of total alkaloid is important.

We are glad to note that the considerable difference in price between Carthagena and Rio Ipecacs still exists, showing that the former, though still apparently used, is in much less demand than the official drug. We again record our opinion that Powder of Ipecac, being to all intents and purposes a preparation, should be required to contain a definite percentage of alkaloid (preferably Emetine).

Jaborandi Leaves.—It is probable that there are few drugs the alkaloidal strength of which varies so much as is the case with Jaborandi. In six samples examined during the year, the percentage of alkaloid, estimated by titration of the extracted bases, varied from 0·03 to 0·08 per cent., thus falling very far short of the generally accepted figures for leaf of good quality. There could be no more important proof of the necessity for standardizing Galenical Preparations than is here offered. We have for many years adopted a standard of 0·048 per cent. alkaloid for the tincure of Jaborandi, and a preparation of uniform therapeutic value is thereby obtained.

Jalap Root.—Ten samples examined during the year yielded a percentage of total resin varying from 9·3 to 10·9, while the corresponding range of percentages of resin insoluble in ether was from 7·5 to 8·7.

Linseed Oil.—An examination of five samples gave figures as tabulated below. It will be noted that, as was also the case last year, the specific gravity was invariably lower than the maximum B.P. limit of 0·940. In the case of the percentage of Iodine absorbed also, this proved as before to be considerably lower than the figures given by Hubl :—

Specific gravity	0·930 to 0·934
Caustic Potash absorbed	18·95 to 19·16
Iodine absorbed	142·85 to 145·9

Earthnut Oil.—In a large number of samples examined the specific gravity varied from 0·912 to 0·921, and the Caustic Potash absorbed gave figures varying from 18·82 to 20·34. An important feature to be considered in testing this oil for pharmaceutical use is the amount of free fat acid present, this in some cases being very high. Our figures on this test ranged from 1·19 to 20·08 per cent., the former being regarded as a satisfactory oil, the latter as quite useless for pharmaceutical purposes.

Olive Oil.—Twenty-seven samples have been examined during the year, the majority of which have proved to be genuine, and the amount of free acid found varied from 0·67 to 14·1 per cent. In our opinion no oil can be regarded as suitable for pharmaceutical use which contains more than 4 per cent. of this constituent. A series of experiments was made with a view of testing the value of the modification of Becchi's test suggested by Tolman (Journal American Chemical Society 24,396.) In our experience this modification serves no useful purpose, since we found that where the Becchi's reagent is freshly prepared no difference between the original and the modified tests was observed as a result of the examination of many samples. We also found that the application of the modified test to an oil containing 10 per cent. of added cotton seed gave so light a colour with the reagent as to render it somewhat doubtful whether the oil was adulterated.

Opium.—In five samples examined the percentage of morphia ranged between 9·37 and 10·96, the moisture varying from 21 to 25·5 per cent. We may here again remark that the difficulty of obtaining an Opium which when dried and powdered has the Morphia content required by the Pharmacopœia still remains, and an addition of milk sugar to dilute has frequently to be made.

Palm Oil.—Saponification figures on four samples examined ranged from 276·2 to 289·2, and the percentage of free acid varied from 20·1 to 55·9.

Balsam of Peru.—In four samples examined the specific gravity ranged from 1·140 to 1·145. The percentage of ether residue varied between 57·0 and 62·4, while the proportion of Caustic Potash absorbed by the residue gave figures ranging between 20·7 and 23·1. These figures are very similar to those reported upon as a result of last year's work.

Pilocarpine Nitrate.—Out of four samples examined during the year three showed melting points approximating to those suggested by Jowett as characteristic of the pure salt. One sample, however, showed a melting point of 138° C., which though answering the characteristic tests given in the Pharmacopœia no doubt contained an impurity, probably Pilocarpidine. It seems not unlikely that this latter alkaloid may be present in leaves of poor quality, decomposition of Pilocarpine having taken place owing to fermentation.

Podophyllum Root.—Seven samples of the root of Podophyllum peltatum examined during the last four or five years have yielded percentages of resin varying from 1·60 to 3·86, or an average of 2·19. These figures are confirmed by the manufacture of Podophyllin on the large scale, and we find it difficult to understand how a standard of 5 per cent. resin for Podophyllum root, such as we have lately seen recommended, can have been arrived at, unless the Indian root (P.emodi) be included. A sample of this latter, examined during last year, yielded us 6·69 per cent. of total resin.

Castor Oil.—Six samples examined during the year showed specific gravity of from 0·962 to 0·963, and we may here again remark that we consider the specific gravity range given in the Pharmacopœia unnecessarily wide. The whole of the samples examined gave a yellowish brown colour with the Sulphuric Acid test of the Pharmacopœia, and we again call attention to the advisability of an alteration of the official phraseology.

Scammony Root.—In thirteen samples examined the percentage of resin ranged from 0·8 to 13·0, giving an average of 7·98 for the whole. Omitting the abnormal sample containing less than 1 per cent., the mean resin percentage of the whole works out at 8·6. We consider that a root of good commercial quality may be depended upon to yield not less than 8·5 per cent. of resin.

Two samples of Scammony examined during the year yielded respectively 1·09 and 3·3 per cent. of ash, with in the one case 90 and in the other 82 per cent. of resin soluble in ether.

Nux Vomica.—A sample of seeds examined yielded 2·87 per cent. of total alkaloids and 1·26 per cent. of Strychnine. We find the alkaloidal content of this drug to be fairly constant.

Stramonium Leaves and Seeds.—A home-dried sample of these leaves yielded us 0·2 per cent. of alkaloid (titrated). Our experience tends to show, however, that this drug is liable to considerable variation in alkaloidal strength, and another proof of the importance of standardizing tinctures is here afforded.

A sample of seeds yielded us 0·3 per cent. of alkaloid, and we are inclined to think that published figures place the average percentage of alkaloids in this drug somewhat high.

Eucalyptus Gum.—A sample of this drug gave us 85·3 per cent. soluble in water, and 89·4 soluble in alcohol (90 per cent.) We consider that a somewhat more definite statement than that of "almost entirely soluble" is desirable as an official guide.

Cannabis Indica.—The proportion of matter soluble in 90 per cent. alcohol contained in this drug is found to be extremely variable. Eleven samples showed percentages varying from 5·4 to 14·3, or an average of 10·5. The sample containing 14·3 per cent. of soluble matter yielded 8·03 per cent. of resin, showing that the alcohol dissolves out about 6 per cent. of matters other than resin, which are probably inert.

Gamboge.—A sample of Gamboge gave 76·8 soluble in 90 per cent. spirit, and 16·1 per cent. further soluble in water, making a total of 92·9 per cent. soluble.

Ammoniacum and Galbanum.—One sample of each of these examined during the year gave 64·1 and 55·0 per cent. respectively, soluble in 90 per cent. alcohol. Our experience tends to show that the Ammoniacum of commerce is fairly constant in value, but that Galbanum shows considerable variations.

Styrax.—Six samples examined during the year showed percentages of matter soluble in 90 per cent. alcohol ranging from 61·1 to 73·3. The percentage of free Balsamic Acids present varied from 2 to 5, and of combined acids from 18 to 19 per cent. The method adopted for the estimation of the latter is that suggested by Barclay and Mann in connection with their paper on Compound Tincture of Benzoin (see *Chemist and Druggist*, March 15th, 1902.) It may be noted that the Styrax of commerce frequently contains a considerable amount of water, as much as 36 per cent. having been found in one of the samples examined.

Tartaric Acid.—An examination of commercial samples for lead showed 0·001 as a minimum, and 0·004 as a maximum. There is no doubt but that this drug has considerably improved in respect of freedom from lead during the last year or two.

Balsam of Tolu.—We had occasion in our report of last year to call attention to the unsatisfactory character of the official test for this drug, and our research on the estimation of

Balsamic Acids in drugs of this class have enabled us to apply our method to Tolu with useful results. In the examination of seven samples, we have found the proportion of matter soluble in 90 per cent alcohol to vary from 74·7 to 86·2 per cent. The percentage of free balsamic acid ranged between 8·8 and 18, while the corresponding combined acid showed percentages of from 7·69 to 26·62. These figures give evidence of a very considerable variation in the value of commercial samples of this drug, and here again the importance of standardization of the preparations into which it enters is clearly shown.

We have already suggested a standard for amount of Balsamic Acids present in Compound Tincture of Benzoin, and in Tincture of Tolu, and we see no reason why some standard for available acid in Syrup of Tolu should not also be made use of.

Mustard Oil.—Two samples examined both gave specific gravities of 0·918, the one having a saponification equivalent of 319·7, the other 318·2.

Oil of Stavesacre.—A sample of this oil prepared in our own works gave us a percentage of mixed alkaloids corresponding to 2·66 per cent., and a saponification equivalent of 309·7. As we have previously had occasion to remark, the Nursery Ointment which we prepare from this drug is standardized to an alkaloidal strength of 1·2 per cent.

Slippery Elm Bark.—A sample of reputed powder from this drug came into our hands during the year from a foreign source. It proved on microscopic examination to have a large proportion of wheat flour, the presence of which was confirmed by the great amount of starch found by chemical examination. A comparison of this powder with some obtained in our own mills proved the value of the test suggested by Beringer, and mentioned in the United States Dispensatory, 18th edition, page 1420.

Ginger.—The following figures showing the results of the examination of three qualities of Ginger of commerce are of interest as indicating the proportion of Oleo-resinous matter present in the rhizome:—

	Jamaica.	Cochin.	African.
Percentage soluble in 90 per cent. Alcohol	4·35	4·57	9·93
Percentage soluble in Ether of 0·717 gravity	4·76	6·04	11·09

Capsicum.—A sample of Capsicum minimum yielded 15·67 per cent. soluble in Ether of specific gravity 0·717, and a sample of Capsicum annuum gave 15·34 per cent. to the same solvent.

ASH-YIELD OF DRUGS AS TEST OF PURITY.

The quality of the majority of drugs in their crude condition has to be judged to a large extent by their external appearance, and adulteration may in the vast majority of cases be detected by the eye, or by the use of an ordinary lens. For the retail pharmacist, however, who not uncommonly purchases drugs in the form of powder, it is important that he should have a ready means of ascertaining the purity of these, and for that reason we have during the year had a number of experiments made upon the ash-yield of mineral-containing drugs and the corresponding powders ground in our own-mills.

In the list which is given below the figures for ash percentages on powders are obtained by the examination, not of specially selected drugs, but of such as are ground by ourselves in our own mills in the ordinary way of business. We attach no value to determinations of ash in drugs previously brushed or prepared, since the pharmacist has to deal not with these but with such goods as come into commerce in the ordinary way.

TABLE showing percentages of ash yielded by drugs of good quality, and by powders obtained from the grinding of drugs of the same character in our own mills.

	Whole drug.	Powder from own mills.
Acaciæ gummi	2·74	2·99
	2·80	3·18
	2·75	
Aconiti radix (Anglic) ..	1·96	
(Exotic) ..	4·51	7·65
Aloe Barbadensis ..	1·73	1·51
	1·17	2·58
Aloe Socotrina	2·08	2·09
	0·77	
Aloe Uganda	0·59	
Ammoniacum	1·99	
Anethi fructus	7·73	
Anisi fructus	7·70	8·30
		10·78
Anthemidis flores ..	5·72	6·28
	5·78	
	5·54	
	5·54	
Araroba	2·53	
Arnicæ rhizoma	7·08	
Aurantii cortex	5·17	
Aurantii cortex	4·54	
	6·06	
Belladonnæ folia	12·82	10·85
Belladonnæ radix ..	9·26	5·29
Benzoinum	0·92	
Balsamum Tolutanum ..	0·40	
	0·36	
	0·34	
	0·39	
Buchu folia	4·71	4·64
Calumbæ radix	4·72	6·97
Cambogia..	0·38	1·81
Cannabis Indica	15·56	14·92
Cantharis	5·08	7·63
Capsici fructus	5·37	6·06
Cardamomi fructus ..	4·50	
	5·12	
Cardamomi semina ..	7·53	
	3·49	
	3·70	

	Whole drug.	Powder from own mills.
Carui fructus	6·20	6‘74
	5·76	6·20
	5·49	
Caryophyllum	4·62	4·66
	5·37	
	6·01	
Cascara Sagrada	5·51	
	6·09	
Cascarilla	8·27	
Cassiæ pulpa	2·57	
Catechu	3·38	5·34
Chirata	4·01	3·09
Chrysarobinum	0·11	
Cimicifugæ rhizoma	6·21	
Cinchonæ rubræ cortex	1·36	5·20
Cinnamomi cortex	4·94	4·75
	4·17	
Cocæ folia (Bolivian)	4·02	
(Peruvian)	8·09	
Coccus	3·41	9·49
Colchici cormus	1·85	2·51
Colchici semina	4·02	5·25
Colocynthidis pulpa	12·00	
	10·10	
	12·40	
	11·40	
	11·20	
	11·70	
	11·70	
	11·20	
Conii folia	15·14	
Conii fructus	5·53	
Coriandri fructus	4·06	
	4·93	
Cubebæ fructus	6·42	7·32
Cuspariæ cortex	8·02	
Cusso	9·40	
Digitalis folia	11·21	9·39
Ergota	3·19	3·25
	2·82	4·10
	2·92	2·69
	3·07	4·31
	3·70	3·14
Eucalypti gummi	0·17	
Euonymi cortex	8·96	
Filix mas	3·27	
Fœniculi fructus	8·46	10·79
Galbanum	4·45	
Galla	1.76	1·75
Gelsemii radix	1.57	
	1·79	
Gentianæ radix	2·43	4·53
	3·54	
Glycyrrhizæ radix	4·47‡	3·30
	4·85	

‡ Not decorticated.

	Whole drug.	Powder from own mills.
Glycyrrhizæ radix	2·04	
	3·66	
Granati cortex	5·99	
Guaiaci lignum	1·05	
Guaiaci resina	0·60	2·50
Hæmatoxyli lignum	1·58	
Hamamelidis cortex	3·42	
Hamamelidis folia	5·54	
	4·32	
Hemidesmi radix	3·76	
Hydrastis rhizoma	4·35	
Hyoscyami folia (Exotic)	21·91	
(Anglic)	14·02	12·43
Ipecacuanhæ radix	2.38	2·23
	2·12	2·65
	2·45	2·03
	2·69	2·19
	2·38	3·38
		2·72
		2·59
		3·29
		2·55
		2·88
		2·49
Jaborandi folia	4·54	
	4·63	
	4·16	
	4·01	
Jalapa	4·31	3·78
	3·33	
	3·46	
	3·61	
	3·62	
Jalapæ resina	0·22	
Kino	0.80	
Krameriæ radix	2·51	4·37
Laurocerasi folia†	6·21	
Limonis cortex	3·66	
Lobelia	3·37	9·48
	4·68	
	3·84	
Lupulin	13·42	
Lupulus	6·90	
	7·46	
Mezerei cortex	3·09	
Myristica	1·91	2·46
	1·68	
Myrrha	2·58	5·82
	6.69	10·72
Nux Vomica	1·13	2·45
Opium	3·77	7·18

† Dried.

	Whole drug.	Powder from own mills
Opium	6·34	4.52
	3·61	
	2·77	
Papaveris capsulæ	11·28	
	8·63	
Pareiræ radix	2·49	
Physostigmatis semina	3·11	
Pimenta	2·82	3·55
Piper nigrum	3·26	6·32
Podophylli rhizoma	3·16	
Pruni Virginianæ cortex	2·96	
Pterocarpi lignum	1·52	
Pyrethri radix	3·89	
Quassiæ lignum	2·51	
Quillaiæ cortex	7·99	8·19
Rhei radix	4·93	8·80
	7·27	10·01
		10·69
Rhei radix (Anglic)	7·19	7·85
Rosæ Gallicæ petala	1·84	
	3·11	
Sambuci flores	10·02	
Sarsæ radix	6·02	
(Mexican)	10·46	
(Honduras)	5·75	
(Lima)	5·12	
Sassafras radix	0·77	
Scammoniæ radix	9·12	
Scammonium	3·42	
Scilla	2·08	2·51
Scoparii cacumina	2·26	
Senegæ radix	4·26	4·24
Senna Alexandrina	7·88	8·61
	8·55	
	8·15	
Senna Indica	8·35	9·45
	7·33	

	Whole drug.	Powder from own mills.
Senna Indica	8·67	
	6·82	
	7·71	
Serpentariæ rhizoma	5·76	10·13
Sinapis albæ semina	4·05	4·32
Sinapis nigræ semina	4·31	4·32
Staphisagriæ semina	13·26	11·69
Stramonii folia	20·18	22·02
	19·31	
	13·97	
Stramonii semina	2·44	
Strophanthi semina	3·78	
Sumbul radix	6·03	
Tamarindus	2·42	
Taraxaci radix	3.20	
Tragacantha	1·98	2·07
	1·73	2·21
	3·24	
Uvæ Ursi folia	2·45	
Valerianæ rhizoma	11·61	17·44
	11·02	
Zingiber	4·11	3·02
	2·43	3·78
	2·37	5·23
	2·57	6·27
	2·50	4·03
	4·89*	5·91
	5·29*	
	4·11*	
	4.35*	
	3·51	
	4·38	
	5·43	
	4·58*	
	4·13	
	7·37*	
	4·24	

* Bleached.

ESSENTIAL OILS.

Absinthe.—A sample of this oil examined by us during the year proved to have a deep green colour, due to Chlorophyll, and to show chemical characteristics proving the presence of petroleum spirit. The specific gravity of the oil was 0·825, it began to distil at 100°C., and the 13 per cent. distilling below 163°C had a density of 0·780. Another sample of the same oil had a specific gravity of 0·915 with the same intense green colour. From this it appears evident that the samples in question were both prepared by treating the herb with solvents, and that in the case of the former sample the solvent spirit used had not been by any means all removed.

Aniseed.—Two samples examined showed specific gravities of 0·979 and 0·982 respectively, with solidifying points of 12° and 13°C. The melting point of the latter sample proved to be 17° C.

Bergamot.—Five samples examined during the year proved to have specific gravities varying from 0·878 to 0·885. The percentage of linalyl-acetate ranged from 23·8 to 40·2, and the non-volatile residue from 4·75 to 6·2 per cent.

Cajuput.—Twelve samples showed specific gravities ranging from 0·918 to 0·923, and the whole gave satisfactory results with the Cineol test.

Caraway.—A sample of foreign oil examined during the year had a specific gravity of 0·847, and yielded only 3 per cent. of distillate above 200°C, proving it to be more or less decarvonized oil.

Cloves.—Five samples examined during the year showed specific gravities ranging from 1·050 to 1·052, and percentages of Eugenol ranging from 86 to 90 per cent.

Cascarilla.—A sample of this oil prepared in our own works during the year proved to have a specific gravity of 0·942.

Cardamoms.—A sample of Cardamom oil obtained by the distillation of the fruits in our own laboratory gave us an oil having a specific gravity of 0·9373. We found that it required 15.41 per cent. of KOH for saponification, and it proved to be soluble in four times its volume of absolute alcohol.

Cassia.—Three samples of this oil examined during the year showed specific gravities of 1·061, 1·062, and 1·065 respectively, and gave percentages of Cinnamic aldehyde as follows: 72·7, 73·6, and 73·0.

Cinnamon.—Two samples of foreign oil examined proved to have 26 and 36 per cent. only of Cinnamic aldehyde, while a sample of English oil with a specific gravity of 1·034 showed 84·2 per cent. of the important ingredient.

Copaiba.—Four samples of this oil prepared in our own works showed specific gravities ranging from 0·910 to 0·914, and rotation figures of from –24° to –31° in a 100 m.m. tube. We have not so far met with genuine oil giving a rotation figure lower than the first named.

It is somewhat remarkable that the Pharmacopœia, although under Copaiba giving limits for rotation figures, makes no mention of these under Oleum Copaibæ, confining itself to the remark that the latter rotates the polarized ray to the left.

Cubebs.—Eight samples of Cubeb oil of our own manufacture showed specific gravities ranging from 0·920 to 0·927.

We may say that we have never yet been able to obtain an oil having a specific gravity so low as the minimum of 0·910 given in the Pharmacopœia. The following fractional figures obtained by an examination of one of the samples may be of interest:—

1.—Up to 250°	10 per cent.
2.—From 250° to 260°	25 ,,
3.—From 260° to 270°	48 ,,
4.—From 270° to 280°	11 ,,
5.—Above 280°	6 ,,

Eucalyptus.—An examination of eighteen samples of Phellandrene-free oil gave specific gravities ranging from 0·916 to 0·923, and rotation figures between –5°45′ and +5°15′. All the samples satisfied the Cineol test.

Gaultheria.—Two samples examined during the year showed specific gravities of 1·166 and 1·187, with corresponding Methyl Salicylate percentages of 92·3 and 98 respectively. The boiling point of the samples proved to be 216° and 219° C. respectively. The specific gravity of Methyl Salicylate obtained by synthetic means is 1·186, and no doubt much of the so-called Gaultheria Oil of commerce consists of this compound.

Juniper.—The specific gravity of two samples of English oil examined during the year proved to be 0·867 and 0·879 respectively, the corresponding rotation figures being –9° and –6°.

Three samples of foreign oil showed specific gravities ranging from 0·866 to 0·871, and two of the samples in question were dextrogyrate.

Lemon.—Four samples examined during the year showed the same specific gravity of 0·857, and rotation figures varying between 58° and 59°. The percentages of Citral obtained by the examination of two samples were 6·1 and 6·0 respectively. We continue to adopt the Citral test, using the Burgess and Child method as giving the most satisfactory results.

Lavender.—Two samples of Mitcham Oil examined during the year showed specific gravities of 0·883 and 0·884 respectively. A determination of Linalyl Acetate in the samples gave percentages of 6·9 and 7·7 respectively. The specific gravity of six samples of foreign oil ranged from 0·870 to 0·888, and the Ester percentage lay between 8·31 and 33·42, the latter a Monte Rose Oil.

Origanum.—Six samples of this oil examined during the year showed specific gravities ranging from 0·883 to 0·908, while the corresponding Phenol percentages varied from 4·2 to 8·6 per cent.

Petitgrain.—A sample of this oil examined showed a specific gravity of 0·888, and a Linalyl Acetate percentage of 45·62.

Pimenta.—Two samples examined during the year showed specific gravities of 1·027 and 1·042, with respective percentages of Eugenol corresponding to 76·0 and 88·7.

Peppermint.—Four samples examined during the year showed specific gravities of from 0·900 to 0·908. The percentage of Menthyl Acetate in the samples varied from 8·5 to 9·8, and that of free Menthol gave figures ranging from 48·5 to 58·06, the last-named amount being found in a sample of English oil.

Pennyroyal.—Two samples of genuine oil showed rotation figures of 18·5 and 19·5 respectively. A third sample of oil had a specific gravity of 0·917, a rotation figure of 3°30′, and a distinct odour of peppermint. These figures seem to point to the presence of an admixture with a large proportion of peppermint oil probably of an inferior character.

Rose (Otto of Rose.)—Eleven samples examined during the year showed specific gravities ranging from 0·855 to 0·874. The melting and solidifying points of the samples accorded fairly well with the published figures, but several of them gave suspicious results on the application of the test given for Geranium Oil in the United States Pharmacopœia.

Rosemary.—The specific gravity of five samples of foreign oil ranged from 0·880 to 0·900, and the rotation figures obtained varied round wide limits, one sample giving a rotation of less than a degree, and another of 11°. Several of the samples proved to be insoluble in twice their volume of 90 per cent. alcohol, pointing to the likelihood of adulteration with French or American Turpentine, or a mixture of both.

A sample of English oil showed a specific gravity of 0.929 and a rotation figure of 1°45′.

Savin.—Two samples of English oil showed specific gravities of 0·921 and 0·924, with rotation figures of +40°·5 and +39°, and distillates below 200 C. of 24 and 26 per cent. respectively.

Sandal Wood.—Seven samples examined showed specific gravities ranging from 0·973 to 0·977, and rotation figures of from −15½° to −18°. Three samples assayed for Santalol gave 97·9, 96·45, and 91·9 per cent. respectively. As we have before had occasion to remark, the physical characters of this oil vary round very small limits.

GALENICAL PREPARATIONS, etc.

It is now fourteen years since we published a pamphlet entitled " A new departure in Therapeutics," and placed before the medical profession and the trade a series of standardized Tinctures, each of which was guaranteed to contain a definite percentage either of known active principle, or of total extractive matter. Amongst the Tinctures for which standards were provided were those of Aconite, Belladonna, Cinchona, Colchicum, Conium, Gelsemium, Henbane, Lobelia, Stramonium, and Veratrum, none of which were at that time officially standardized. Since that time we have left no stone unturned to induce the Authorities to increase the number of Standardized Preparations contained in the Pharmacopœia ; we have published researches and suggested methods for doing this from time to time, and we are glad to think that our efforts have been not altogether without result, since the 1898 Pharmacopœia included several new Standardized Tinctures.

In addition to advocating the use of alkaloidal standards where obtainable, we have also urged the desirability of obtaining uniformity in tinctures by the adoption of standards for extractive matter, which we have used for the last fifteen years. Until recently our suggestions in this direction have been received, as we had occasion to remark in our last report, with grudging appreciation, but we are pleased to find that during the last few months our lead has been followed in several quarters, and more than one paper has been published suggesting standards such as we have always advocated. We are also interested to see that our example is being followed by some of the transatlantic manufacturers who supply the English market, but if these latter call attention to originality in a more general adoption of such standards for Galenicals, we must at once decline to admit their claim. The stand taken by the Local Government Board of Ireland in the publication of a number of standards for Galenical Preparations has no doubt done much to increase the importance of the whole question, and we sincerely hope that before very long the Pharmacopœia will not only include standards of this kind, but will also take such a form as to enable it to be used as a legal standard in cases of prosecutions under the Food and Drugs Act.

A very valuable contribution to the subject of Standardization of Drugs has been made by the publication during the year of a work entitled, " Suggested Standards for Foods and Drugs," by C. G. Moor, M.A., late Public Analyst of the City of Exeter. We can commend this book to the notice of all those interested in the subject of the Pharmacopœia as legal standard.

In order that our friends may have an opportunity of making acquaintance with all the standardization work which we have hitherto published, we are in this report recapitulating the standards which from time to time have found mention in the Journals, in addition to a number of fresh standards, which in our report of last year we promised to provide when next we went to press.

The lines upon which to work in the case of drugs containing known active principles, such as Alkaloids, Glucosides, Organic Acids, etc., are easily laid down. In other cases we think it desirable, so far as possible, to obtain uniformity of therapeutic value by making use of standards for specific gravity and proportion of dissolved matter. We are well aware that the use of standards of this kind is by no means completely satisfactory, but it is our opinion that until chemical and therapeutical researches have been carried further, and the active principles of the drugs in question have been isolated, it is best to adopt an intermediate course, and to, so far as practicable, offer the medical practitioner a preparation which will vary as little as possible in its action.

TABLE

SHOWING SUGGESTED STANDARDS, RANGES
OF SPECIFIC GRAVITY, ETC.,

FOR

GALENICAL PREPARATIONS.

Name of Preparation.	Range of Specific Gravity.	Suggested Standard for Extractive Matter. (For fluids—Grammes per 100 c.c.)	Maximum and Minimum percentages (by volume) of Alcohol found by examination of numerous samples.	Suggested Standard for active principle or important constituent. (For fluids—Grammes per 100 c.c.)	REMARKS.
Acetum Cantharidis	1·066 to 1·072				
,, Ipecacuanhæ	0·991 to 0·993	3·62. HA.	11 to 12·5	0·1 total alkaloid	
,, Scillæ	1·035 to 1·040	8		4·0 acetic acid	
Collodium	0·775 to 0·782	2			
,, Flexile	0·790 to 0·797	6·5			
Decoctum Aloes Compositum	1·001 to 1·004	5·6	16 to 17		
,, Granati Corticis Conc.		30·0			
,, Hæmatoxyli Conc.		3·0			
Extractum Belladonnæ Liquidum	0·896 to 0·912		72·0 to 75·0	*0·75 total alkaloid	
,, ,, Viride				1·0 minimum total [alkaloid	
,, Cascaræ Sagradæ Liquidum	1·070 to 1·080	26·0	17·0 to 18·0		
,, Cimicifugæ Liquidum	0·890 to 0·900	12·5	74 to 78		
,, Cinchonæ Liquidum	1·115 to 1·150		10·5 to 12·0	*5·0 total alkaloid	
,, Cocæ Liquidum	1·004 to 1·014	20·0	45·5 to 49·5		
,, Colocynthidis Compositum				20 ether soluble	Scammony resin=[19·8%
,, Ergotæ Liquidum	1·020 to 1·027	15·0	31·5 to 32·5		
,, Filicis Liquidum	1·000 to 1·019				
,, Glycyrrhizæ Liquidum	1·140 to 1·150	42·0	16·0 to 18·0		
,, Hamamelidis Liquidum	1·025 to 1·050	21·0	33 to 34		
,, Hydrastis Liquidum	1·025 to 1·040	20·0	37·5 to 38·5	[minimum	
,, Hyoscyami Viride				0·1 total alkaloid	
,, Ipecacuanhæ Liquidum	0·885 to 0·910		75·0 to 79	*2·00 to 2·25 total [alkaloid	
,, Jaborandi Liquidum	1·020 to 1·040	20 10	33 to 34		
,, Jalapæ				20 resin insoluble in ether	
,, Nucis Vomicæ Liquidum	0·950 to 0·970		57·5 to 61·5	*1·5 strychnine	
,, Opii Liquidum	0·985 to 0·990		17·5 to 18·5	*0·75 morphine	
,, Pareiræ Liquidum	1·050 to 1·065	22·5	20 to 22		
,, Sarsæ Liquidum	1·080 to 1·090	20·0 (without Glycerine)	15 to 17		
,, Strophanthi				4·0 strophanthin	*P.J.*, 1898 (2), p. 655

Extractum Taraxaci Liquidum	1·070 to 1·090	25·0	16 to 20		
Glycerinum Acidi Borici	1·345				
,, ,, Carbolici	1·230				
,, ,, Tannici	1·288 to 1·292				
,, Aluminis	1·288 to 1·292				
,, Boracis	1·280 to 1·295				
,, Pepsini	1·190 to 1·200			1 fl. dr. should dissolve 12.500 grains hard boiled white of egg.	
Infusum Aurantii Conc.		10·2			
,, ,, Compositum Conc. ..		7·2			
,, Buchu Conc.		6·0			
,, Calumbæ Conc...		3·5			
,, Caryophylli Conc.		5·0			
,, Cascarillæ Conc.		2·0			
,, Chiratæ Conc.		4·5			
,, Cinchonæ Acidum Conc. ..				total alkaloid	Standard required
,, Cuspariæ Conc...		8·0			
,, Digitalis Conc.		1·6			
,, Gentianæ Compositum Conc.		6·0			
,, Krameriæ Conc.		8·0			
,, Lupuli Conc.		7·0			
,, Quassiæ Conc.		0·25			
,, Rhei Conc.		10·0			
,, Rosæ Acidum Conc.					
,, Scoparii Conc.		15·0			
,, Senegæ Conc.		10·0			
,, Sennæ Conc.		14·0			
,, Serpentariæ Conc.		4·5			
,, Uvæ Ursi Conc.		10·0		[soluble alkaloid	
Linimentum Aconiti	0·865 to 0·875		78·0 to 80·0	0·25 total ether	
,, Belladonnæ	0·880 to 0·900		69·0 to 72·0	0·375 total alkaloid	
,, Camphoræ	0·924 to 0·927			21·5 camphor	
,, ,, Ammoniatum	0·866 to 0·872		57·0 to 58·0		
,, Saponis	0·895 to 0·900		62 to 64		
Liquor Calumbæ Conc.	0·990 to 0·996	4·25	19·0 to 21·0		

*Officially Standardized.

Name of Preparation.	Range of Specific Gravity.	Suggested Standard for Extractive Matter. (For fluids—Grammes per 100 c·c.)	Maximum and Minimum percentages (by volume) of Alcohol found by examination of numerous samples.	Suggested Standard for active principle or important constitueht. (For fluids—Grammes per 100 c.c.)	Remarks.
Liquor Chiratæ Conc.	1·000 to 1·010	5·5	18·0 to 19·0		
,, Cuspariæ Conc.	1·005 to 1·015	10·0	18·0 to 19·0		
,, Hammamelidis	0·980 to 0·985		16·0 to 18·0		
,, Iodi Fortis	1·010 to 1·025		76·0 to 77·0	11·5 iodine	
,, Krameriæ Conc.	1·015 to 1·025	10·0	18·0 to 19·0		
,, Picis Carbonis	0·855 to 0·865	2·5			
,, Quassiæ Conc.	0·975 to 0·980	0·30	18·0 to 19·0		
,, Rhei Conc.	1·020 to 1·030	12·5	18·0 to 19·0		
,, Sarsæ Compositus Conc. ..	1·030 to 1·040	15·0	18.0 to 20·0		
,, Senegæ Conc.	1·015 to 1·025	12·5	18·5 to 22·0		
,, Sennæ Conc.	1·040 to 1·060	17·5	18·0 to 19·0		
,, Serpentariæ Conc.	0·990 to 1·000	5·0	18·0 to 19·0		
Mistura Sennæ Co.	1·110 to 1·118	16·5	14·4 to 16·6		
Oxymel	1·320*			4·4 acetic acid	
,, Scillæ	1·320*			2·0 acetic acid	
Pulv. Glycyrrhizæ Comp.				9·0 sulphur	
Pulv. Rhei Comp.				68 to 70 ash	
Succus Belladonnæ	0·980 to 0·990		18·0 to 22·0		
,, Conii	0·980 to 0·990		18·0 to 22·0		
,, Hyoscyami	0·980 to 0·990		18·0 to 22·0		
,, Scoparii	0·980 to 0·990		18·0 to 22·0		
,, Taraxaci	0·995 to 1·000		18·0 to 22·0		
Syrupus Aromaticus	1·148 to 1·156				
,, Aurantii	1·270 to 1·280				
,, Calcii Lactophosphatis.. ..	1.310 to 1·320				
,, Cascaræ Aromaticus	1·110 to 1·125				
,, Chloral	1·315 to 1·320				
,, Codeinæ	1·320 to 1·328			[in each fluid dr.	
,, Ferri Phosphatis	1·270			*$Fe_3 (PO_4)_2$—1 gr.	
,, ,, Phos. c. Quin. et Strych.	1·275 to 1·285				

,, Glucosi	1·363 to 1·370			
,, Hemidesmi	1·325 to 1·330			
,, Limonis	1·290 to 1·300			
,, Pruni Virginianæ	1·300 to 1·320			
,, Rhei	1·310 to 1·320			
,, Rosæ	1·325 to 1·330			
,, Scillæ	1·330 to 1·335			
,, Sennæ	1·280 to 1·290			
,, Tolutanus	1·330 to 1·335			
,, Zingiberis	1 300 to 1·310			[soluble alkaloid
Tinct. Aconiti	0·890 to 0·897		68·0 to 70 0	0·02 total ether
,, Aloes	0·970 to 0·985	8·5	38·0 to 41·0	
,, Arnicæ	0·890 to 0·894	0·6	68·8 to 69·8	
,, Asafetidæ	0·914 to 0·920	10·0	56·0 to 62·0	
,, Aurantii	0·880 to 0·890	2·0	72·5 to 76·0	
,, Belladonnæ	0·912 to 0·920*		60 0 to 61·0	*0·05 total alkaloid
,, Benzoini Comp.	0·900 to 0·905	(17·5 to 20·0)	68·5 to 72·5	About 5·0 total balsamic [acids, of which about 2.0 [are free and 3·0 combined
,, Buchu	0·930 to 0·935	4.0	56·0 to 57·0	
,, Calumbæ	0·920 to 0·925	0·8	56·0 to 58·0	
,, Camphoræ Comp.	0·915 to 0·920		56·0 to 59·0	*0·05 morphine
,, Cannabis Indicæ	0·844 to 0·850	4·0	83·0 to 86·0	
,, Cantharidis	0·835 to 0·838	0·25	87·0 to 89·0	
,, Capsici	0·890 to 0·897	1·50	67·5 to 69·5	
,, Cardamomi Comp.	0·945 to 0·950	6·50	54·0 to 56·0	
,, Cascarillæ	0·900 to 0.905		62·5 to 67·5	1·6 resin
,, Catechu	0·972 to 0·978	14·5	51·0 to 53·0	
,, Chiratæ	0·920 to 0·924	0·8	56·0 to 58·0	
,, Chloroformi et Morph. Comp.	1·010 to 1·020		52·0 to 54·0	
,, Cimicifugæ	0·922 to 0·928	2·0	57·0 to 59 0	
,, Cinchonæ	0·915 to 0·925		63·0 to 64·5	*1 0 total alkaloid
,, Cinchonæ Comp.	0·915 to 0·921	5·00	62·0 to 68·0	*0·5 total alkaloid
,, Cinnamomi	0·900 to 0·904	2·4	66·0 to 68 0	
,, Cocci	0·950 to 0·955	2·5	42·0 to 44·0	
,, Colchici Seminum	0·945 to 0·955		42·0 to 44·0	0·075 colchicine

*Officially Standardized.

Name of Preparation.	Range of Specific Gravity.	Suggested Standard for Extractive Matter. (For fluids—Grammes per 100 c.c.)	Maximum and Minimum percentages (by volume) of Alcohol found by examination of numerous samples.	Suggested Standard for active principle or important constituent. (For fluids—Grammes per 100 c.c.)	Remarks.
Tinct. Conii	0·895 to 0·900		66·0 to 68·5	0·09 total alkaloid	
,, Croci	0·924 to 0·928	3·00	56·0 to 58·0		
,, Cubebæ	0·840 to 0·845		83·0 to 85·0	0·2 oleo-resin	
,, Digitalis	0·928 to 0·934	3·6	53·0 to 57·5		
,, Ergotæ Ammon.	0·932 to 0·339	4·0	48·0 to 52·0		
,, Ferri Perchlor	1·085 to 1·088		18·0 to 21·0		
,, Gelsemii	0·917 to 0·925		57·0 to 59·0	0·025 total alkaloid	
,, Gent Comp.	0·964 to 0·968	5·0	42·5 to 43·5		
,, Guaiaci Ammon.	0·894 to 0·900	15·0	69·0 to 71·0		
,, Hamamelidis	0·950 to 0·954	2·0	42·0 to 44·0		
,, Hydrastis	0·920 to 0·926	2·5	56·0 to 58·0		
,, Hyoscyami	0·950 to 0·965		40·5 to 42·5	0·008 total alkaloid	
,, Iodi	0·878 to 0·882		84·0 to 86·0	*2·5 iodine	
,, Jaborandi	0·950 to 0·960		42·0 to 44·0	0·048 total alkaloid	
,, Jalapæ	0·905 to 0·910		65·0 to 67·0	*1·5 resin	
,, Kino	0·992 to 0·996		43·0 to 44·5	5·0 kino-tannic acid	
,, Krameriæ	0·934 to 0·938	5·0	56·0 to 58·0		
,, Lavand Comp.	0·836 to 0·840	0·6	86·5 to 88·5		
,, Limonis	0·880 to 0·888	2·0	67·5 to 71·5		
,, Lobeliæ Æther.	0·810 to 0·816		58·0 to 60·0	0·07 lobeline	
,, Lupuli	0·930 to 0·940	4·0	54·0 to 57·0		
,, Myrrhæ	0·850 to 0·855	5·6	84·0 to 86·0		
,, Nucis Vomicæ	0·910 to 0·914		58·0 to 64·0	*0·25 strychnine	
,, Opii	0·955 to 0·960		40·0 to 44·0	*0·75 morphine	
,, Opii Ammon.	0·895 to 0·900		60·0 to 63·0	*0·113 morphine	
,, Podophylli	0·850 to 0·855		84·5 to 89·0	3·65 resin	
,, Pruni Virg.	0·930 to 0·938	3·0	52·0 to 57·0		
,, Pyrethri	0·895 to 0·900	2·25	66·0 to 69·0		
,, Quassiæ	0·944 to 0·948	(0·22—0·36)	42·0 to 44·0	0·05 quassin	
,, Quillaiæ	0·918 to 0·924	1·25	56·0 to 58·0		

Tinct. Quininæ	0·885 to 0·895		72·5 to 76·0	
,, ,, Ammon.	0·925 to 0·928		53·0 to 54·0	
,, Rhei Comp.	0·970 to 0·975	4·50 (exclusive of Glycerine.)	51·0 to 53·0	
,, Scillæ	0·955 to 0·962	10·0	52·0 to 54·0	
,, Senegæ	0·935 to 0·938	6·5	55·0 to 57·0	
,, Sennæ Comp.	0·985 to 0·994	10·00	38·5 to 40·5	
,, Serpentariæ	0·896 to 0·900	2·00	66·0 to 68·0	
,, Stramonii	0·950 to 0·964		42·0 to 44·0	0·04 total alkaloid
,, Strophanthi	0·892 to 0·895		67·0 to 69·0	0·2 strophanthin
,, Sumbul	0·895 to 0·900	2·5	66·0 to 69·0	
,, Tolutana	0·860 to 0·865		80·0 to 82·0	about 3 balsamic acid
,, Valerianæ Ammon.	0·935 to 0·942	3·0	50·0 to 54·0	[⅓ of which are free
,, Zingiberis	0·835 to 0·840	0·4	88·5 to 89·5	
Vin. Colchici	1·010 to 1·015	7·0		
,, Ferri				0·40 total Fe.

*Officially Standardized.

The following general notes on Galenical Preparations taken from our Laboratory Journal may be of interest.

Spirit of Nitrous Ether.—A sample of this spirit made in March, 1897, proved on examination, a few days before going to press, to yield 24·3 c.c. of gas from 5 c.c. of liquid. Another sample made in October, 1898, gave 29 c.c. of gas from a similar quantity. Both samples had been kept in corked bottles, the necks of which had been dipped in melted paraffin wax. From this it is evident that Spirit of Nitrous Ether will continue to respond to the requirements of the Pharmacopœia test after an interval of more than five years if kept in sealed bottles.

Compound Tincture of Benzoin.—With a view of placing the preparation of this tincture on a satisfactory basis, and of providing a chemical standard of efficiency better than that yielded by an estimation of total solid matter, we, at the beginning of the year, made a number of researches, the outcome of which was the publication of a paper by the Editor of this report and Mr. Mann, of which the following is a reprint taken from *The Chemist and Druggist* :—

After reviewing the published statements dealing with the constitution of the tincture ingredients, the authors stated that these ingredients are used in the proportions of benzoin 10, storax 7·5, balsam tolu 2·5, and aloes 1·83 grammes per 100 c.c., or a total of 21·83 grammes. As all the ingredients, except the aloes, are required by the Pharmacopœia to be "almost entirely soluble in alcohol," it is obvious that 20 per cent. by volume of soluble balsamic ingredients are present, and, after allowing for a possible 10 per cent. of insolubility for each drug, there remains 18 per cent. of dissolved matter below which, in their opinion, the percentage of extractive should not fall. In all cases allowance for insoluble matter in benzoin would, as Dr. Attfield had stated, have to be made where necessary, such allowance in the case of Siam benzoin being considerably less that in that of the Sumatra product. The high price of the Siam drug would, however, render its use as inadvisable as it is unnecessary.

In order to ascertain to what extent commercial samples of the tincture correspond with the 18 per cent. standard, the authors had examined seven, with the following results :—

—	1	2	3	4	5	6	7
Sp. gr. ..	0·8885	0·897	0·8995	0·897	0·896	0·9045	0·905
Solids ..	14·99	17·62	17·22	15·85	17·47	18·03	19·25

No. 2, 3, 5 and 6 were properly prepared, Nos. 1 and 4 were weak, and No. 7 abnormally strong, and was peculiar in other respects. The figures show that the 18 per cent. standard is just. "Solids" figures are grammes in 100 c.c.

The second part of the paper dealt with a suggested standard independent of percentage of extractive matter. A preparation which owes its medicinal value to compounds capable of chemical estimation, should be required to contain some definite percentage of these constituents approximately estimated. The authors, therefore, experimented with a view of obtaining a process for estimating free and combined benzoic and cinnamic acids. Their experiments were first made with the tincture ingredients, and the process followed in the case of benzoin may be taken as an example of what was done in the other cases:—

From 1-2 grammes of the drug was treated with 25 c.c. of chloroform, the solution filtered, the filter washed with chloroform, and 50 c.c. of distilled water added to the solution. The liquid so obtained was titrated with decinormal soda solution, phenol-phthalein being used as an indicator, and the results calculated into benzoic acid (1 c.c. $N/10$ $NaOH = 0{\cdot}0121$ C_5H_6COOH). To estimate the combined acid the chloroformic solution from the above-mentioned titration was separated from the water (containing benzoate and cinnamate of soda in solution) and the chloroform removed by distillation over the water-bath. To the residue 50 c.c. of 2½ per cent. soda solution was added, and the mixture boiled for an hour under a reflux condenser. It was then transferred to a separator, and shaken with 10 c.c. of chloroform, excess of dilute hydrochloric acid was then added, and the mixture agitated with 5 c.c. of chloroform four times. The chloroformic solution of the acids was next washed with several successive portions of water until the washings ceased to affect litmus paper. To the washed chloroformic solution now remaining 50 c.c. of water was added, and titration conducted as before, the figure obtained being taken to represent combined acids, and being calculated as before into terms of benzoic acid. In dealing with the tincture, 10 c.c. were taken and evaporated at a low temperature to a syrupy consistency, 25 c.c. of chloroform were added to the residue, the chloroformic solution filtered, the filter washed, and after the addition of 50 c.c. of water titration was proceeded with as above. The estimation of combined acid in the tincture residue was performed exactly as described.

Saponification of the esters was at first performed with alcoholic soda, but as aqueous alkali gave exactly the same results it was adopted. In dealing with benzoin and tolu, an estimation of alcohol-soluble matter was first made, and the results for free and combined acids calculated to a basis of 90 per cent. solubility. The following table shows the mean results obtained from an examination of several specimens of each drug :—

———	Free Acid.	Combined Acid
Benzoin (Siam)	5·29	29·51
Benzoin (Sumatra)	11·58	16·86
Storax	5·29	18·82
Tolu balsam	18·20	22·47

The figures obtained accorded fairly well with those generally accepted as giving the proportions of balsamic acid present in the drugs. A calculation was next made to ascertain the theoretical percentage of free and combined acids yielding to the tincture by drugs having the mean acid values given in the table. The results obtained were for free acid in tincture (theoretical), 1·96 grammes per 100 c.c.; for combined acid in tincture (theoretical), 3·70 grammes per 100 c.c.

The next table shows the results (grammes per 100 c.c.) of the assay for balsamic acids of the seven samples of commercial tinctures:—

———	1	2	3	4	5	6	7
Free acid ..	1·69	2·00	1·88	1·96	1·91	2·09	2·38
Combined acid ..	2·71	3·34	3·51	2·37	3·25	3·20	2·58

The mean percentages of all samples were, for free acid 1·99, for combined acid 2·99, but as tinctures Nos. 1 and 4 have already been shown to be weak in extractive, and the proportions of free and combined acids in No. 7 were peculiar, these three samples were best left out of consideration, and the mean percentages for the remaining four tinctures noted. These were:—

Mean percentage (grammes per 100 c.c.) of free acid in tinctures, 1·79.
Mean percentage (grammes per 100 c.c.) combined acid in tinctures, 3·32.

The calculated and actual percentages of free acid are almost identical, whilst the calculated percentage of combined acid is about 10 per cent. higher than the actual. The authors concluded by suggesting as a standard for the tincture that it should, when assayed by their process, "yield not less than about 5 per cent. of balsamic acids calculated as benzoic, out of which neither more nor less than about two-fifths should be present in an uncombined condition."

Belladonna, Green Extract of.—In order to ascertain to what extent the variation in crop of this drug affects the alkaloidal content we continue to make systematic assays of the finished extract, the whole being carefully bulked before the sample for experiment is taken. Our test of extract prepared from several tons of the fresh herb showed this year a percentage in total alkaloid of 1·50 per cent. by titration. An extract obtained by a second pressing of the herb gave 1·68 per cent. of total alkaloid. A comparison with the figures for these extracts given in our report of last year shows that the 1902 crop was stronger in alkaloid than that of the previous year.

Henbane, Extract of.—The year's crop of Henbane herb gave an extract showing the presence of 0·11 per cent. of total alkaloid by titration, and an extract obtained by a second pressing on the same lines as Belladonna (see above) showed a percentage of 0·13 per cent.

Fresh Tincture of Henbane.—As the outcome of some experiments on the preparation of a Tincture of Henbane from fresh herb, a note by us on this subject was published in *The Chemist and Druggist* of July 6th, 1902. We there show that a very satisfactory preparation can be obtained from the fresh herb, and suggest the advisability of its inclusion in the forthcoming Pharmacopœia.

Estimation of Strophanthin.—In a letter to the Editor of *The Pharmaceutical Journal* which appeared in the issue of that journal dated June 15th, 1902, we called attention to the fact that the method of estimation of Strophanthin given by Dohme had for some time previously been published by ourselves. We continue to make use of this method for the standardization of Strophanthus preparations, and find it to give excellent results.

New Distilled Waters.—During the year we have introduced four new Distilled Waters to the notice of the medical profession and the trade, viz.:—those of Cascarilla, Cardamoms, Hop, and Wild Cherry Bark. The waters are agreeable in flavour, and satisfactorily present the volatile constituents contained in the drugs.

Acetum Scillæ.—In a discussion which arose round a prosecution under the Food and Drugs Act, we were asked by the Editor of *The Chemist and Druggist* to give our opinion on the characters of a properly prepared Vinegar of Squill. In a letter to *The Chemist and Druggist*, dated May 16th, we pointed out that we standardized this preparation to a specific gravity of 1·040, and an acid percentage of 4. With regard to total extractive, we found this to usually fall between 8 and 9 per cent., and our experience showed that though up to a certain point the percentage of free acid present might slightly diminish on keeping, it was, owing to fermentation, likely to increase in a preparation of considerable age.

Miscible Fluid Extract of Nux Vomica.—Experiments made with a view of obtaining a fluid extract, which, when mixed off, would give a clear and bright tincture, have in our hands met with success. We find that if the powdered seeds be percolated with Petroleum Spirit to remove fat, and subsequently dried prior to treatment with alcohol, an extract is obtained which mixes perfectly clear in the official menstrum. It is hardly necessary to remark that the Petroleum Spirit removes little or no alkaloid.

Total extractive matter of Compound Tincture of Rhubarb.—Our attention having been called to the fact that a number of figures have lately been published giving a figure for solids yielded by Tincture of Rhubarb, which evidently included the glycerine, we some little time since made an experiment showing the unreliability of a figure so obtained. The following figures show the effect of drying the solids of this tinctue on a water bath for varying periods :—

	Total extractive matter per cent.
After 1 hour's drying	16·89
,, 2 ,, ,, ...	16·60
,, 4½ ,, ,, ...	14·81
,, 6½ ,, ,, ...	14·09

Our practice in the case of this tincture is to standardize it to contain 5 per cent. of solid matter before the addition of the 10 per cent. of glycerine required by the pharmacopœia.

Boric Lint and Wool (**50 per cent.**)—An examination of two samples of the former made during the year proved them to contain 51·3 and 52·8 per cent. respectively of Boric Acid, while for the latter the figures obtained were 51·3 and 46·9 per cent.

Liniment of Camphor.—The examination of sixteen samples of this Liniment made by us during the year gave figures for percentage of camphor varying from 20·97 to 21·78. We call attention to the fact that in spite of the evidence which this gives of an exact and careful preparation of the Liniment, we continue to make an assay of each batch as it comes out of the works, in order to prevent the possibility of error.

" LOFOTOL."

We have during many years made a special study of Cod Liver Oil, and by reason of having a factory for its manufacture in Norway we are particularly well placed for conducting our researches.

As the outcome of numerous experiments made with a view of increasing the palatability of this oil, we have at length evolved a device which we think will inauguarate a new era in the therapeutics of Cod Liver Oil.

During the year we have placed on the market, under the registered title of "Lofotol," a combination of pure Norwegian Cod Liver Oil with Carbonic Acid Gas. The result is a highly palatable, easily digestible oil, of which the tendency to become rancid is reduced to a minimum. "Lofotol," which is protected by Patent Rights, has already found considerable favour with the Medical Profession and the public.

PUBLIC ANALYSTS AND THE ANALYSIS OF PHARMACEUTICAL PREPARATIONS.

The following instance, which we give without mention of names, illustrates the unfortunate incapacity of certain of the officials who have to do with the administration of the Food and Drug Act.

In July of last year we were informed by a retail chemist, one of our customers, that a sample of Tincture of Opium of our manufacture had been found deficient in alcohol, and that he had been admonished as a first offender by the City Authorities. We at once obtained an analysis by a well-known London chemist of our friend's sealed sample, and received a report to the effect that the tincture was of absolutely B.P. quality. On informing our customer of this fact, he endeavoured to obtain restitution from the local Authority, or to have the case made public, in order that he might clear himself and us. To our great surprise, however, the Authorities in question declined to take action in the matter, and announced themselves well satisfied with the report of their analyst.

There is, of course, no doubt whatever but that this is an instance of a gross error on the part of the analyst, to which he had not the saving grace to confess, and we cite it as a case of the unfortunately not infrequent ineptitude of the officials appointed by local Authorities to make analyses of drugs.

DUTY-FREE ALCOHOL FOR MANUFACTURING PURPOSES.

In June of last year considerable interest was aroused by an announcement that under the Finance Act of that month it was the intention of H.M. Government to frame certain regulations for the use of Duty-free Alcohol for manufacturing purposes. Enquiries made by us from the Inland Revenue Authorities resulted in our being informed that only in special cases would the permission in question be granted, and that such permission would involve the employment by the manufacturer enjoying the privilege, of special Excise officer, and special premises, etc. We consider that the use of pure alcohol in Pharmaceutical manufactures would be a very considerable boon, and we hope that before long the Government will make the concession more generally applicable.

We note, with interest, attempts which are being made by the Society of Chemical Industry to bring the question before the Government in a concrete form.

In a letter addressed by us to the Editor of *The Chemist and Druggist* we pointed out that the exportation of Spirituous Preparations abroad was considerably hampered by the present method of drawback allowances, and we were surprised to learn from him that this experience was not shared by manufacturers generally.

GUARANTEE OF B.P. QUALITY.

We are sometimes asked how it is that we do not use some form of guarantee with the drugs and preparations which we supply, and we call attention to the fact that in all cases the labels which we use for our goods are themselves guarantees of quality. Where we label a drug or preparation B.P., it is to be clearly understood that we take full responsibility for its quality, and that we are prepared to stand by the fact that it is as labelled.

SURGICAL DRESSINGS DEPARTMENT.

The analytical work in connection with this department consists in the supervision of the chemical process used in the bleach works, and in the preparation of antiseptics, as well as in the testing of the latter after manufacture, in order to ascertain whether they contain the stated proportions of antiseptic agent. Being, as we believe, the only Manufacturing Chemists in the world who weave, bleach and manufacture Surgical Dressings plain and antiseptic from the raw materials, we are particularly well placed for turning out these goods in a satisfactory manner, and the supervision which our Analytical Department is able to use in these works is of considerable value. In addition to the routine work alluded to above, researches are constantly being made with a view of improving and developing the processes used, and for further information we refer our customers to the separate price list which we publish of Surgical Dressings and similar goods.

AËRATED WATER FACTORY.

A by no means unimportant part of the work in out Analytical Department consists in the constant supervision of this Factory. Samples are constantly being taken at haphazard and analyses made, first, to ascertain the purity of the DISTILLED WATER USED, secondly to check the proportion of dissolved salts contained in the various waters. Any possible contamination of the waters with metallic impurities has also to be guarded against, and when new plant is put in, or repairs made, the quality of the parts used undergoes rigid chemical examination. The advantages of manufacturing aërated waters under supervision of this kind are too obvious to require future comment.

THE QUALIFIED RETAIL CHEMIST AS AN ANALYST.

We wish to draw the especial attention of our customers and others to the suggestion which we are making this month, whereby they may undertake analytical work required by the public. We are fully convinced that a lucrative business might be done in this class of work if proper facilities for obtaining analyses on reasonable terms were placed within reach of the public. The daily increasing demand for assurance as to the purity of foods and drinks should, in our opinion, be put to profitable use by qualified chemists, and where, as is often the case, it is impossible for them to undertake work of this class themselves, it is obvious to us that the opportunity of having it done speedily, and of at the same time sharing in the proceeds, will be generally acceptable.